THE STRUCTURAL HETEROGENEITY OF CONTINUOUSLY CAST BLANKS FROM SECONDARY BRONZE

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Continuously cast blanks of secondary non-ferrous alloys are promising economically viable production, what allows to solve not only the problem of disposal of non-ferrous metals, but also significantly reduce the production cycle of its processing into finished products [1-3].

The purpose of this paper is to assess the heterogeneity of the secondary continuously cast bronze type БрОЦС: it studied the changes in the structure and hardness of the cross-section of continuously cast blanks with a diameter of 50 mm bronze type bronze БрОЦС 3-12-4 and 5-6-5 in cross section. Bronze БрОЦС 3-12-4 contained wt%.: 8-15 Zn, up to 0,5 Sb, 2-4 Sn, and bronze БрОЦС 5-6-5: 4.5-6.5 Zn, up to 0,5 Sb, 4.1-6 Sn; chemical composition corresponds with reference data [2].

The first step was studied hardness cast blanks, it is measured according to Brinell hardness tester at ТШ-2М load 1875 N (indenter diameter 2.5 mm). Fig. 1 shows that the hardness of the bronze БрОЦС 5-6-5 distributed fairly evenly across the section, and in bronze БрОЦС 3-12-4 heterogeneity developed noticeable.

The microstructure was studied by microscope МИМ-7 with an magnification in 160 (Fig. 2 and 3). It is seen that in a cast bronze quite clearly manifested segregation. As a consequence the temperature interval between the liquidus and solidus lines in the diagram of copper and tin, to abolish the consequences of dendritic segregation, or at least reduced, which can probably be followed by heat treatment of cast billets.

The microstructure of continuously cast blanks is formed in a continuous movement and the passage of the cooling zones crystallizing metal of varying intensity. Because of these features of the internal structure of continuously cast blanks liquation processes occur with the formation of defects in the chemical heterogeneity. Most of these defects are formed in the axial section of the blank.

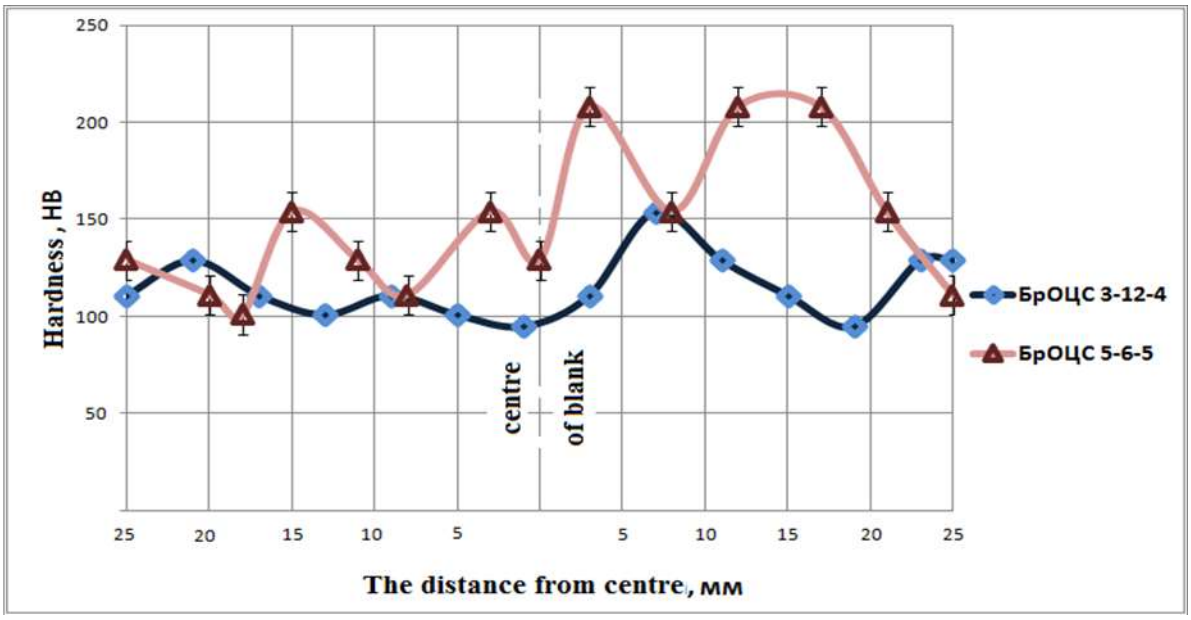
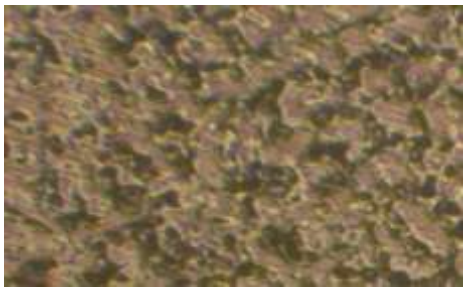


Fig. 1 - Bronze БрОЦС hardness distribution on the cross section of 50 mm in diameter blank.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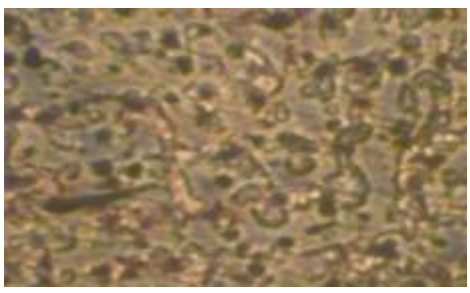
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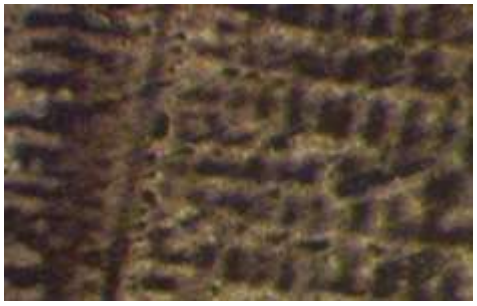
Fig. 2 - Microstructure of bronze БрОЦС 3-12-4: centre of blank (a), $^{1}/_{2}$ of radius (b) and surface (c), × 160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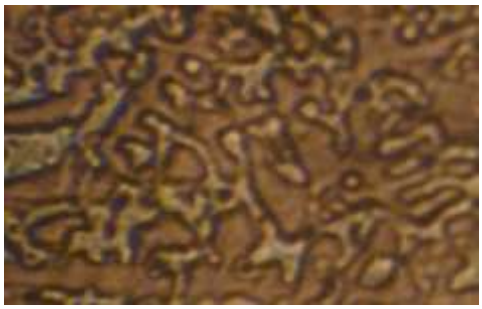
c)

Fig. 3 – Microstructure of bronze БрОЦС 5-6-5: centre of blank (a) $^{1}/_{2}$of radius (b) and surface (c), × 160

Conclusion. Continuous cast blank 50 mm in diameter from the ОЦС type secondary bronzes directly to the delivery condition can be used to produce from it a limited range of products, it may be used for the responsible product only after the heat treatment reduces the negative effect of dendritic heterogeneity.

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